*J. Child Lang.* **24** (1997), 673–694. Printed in the United Kingdom


# Sources of support for learning words in conversation: evidence from mealtimes*

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(*Received* 22 *February* 1996. *Revised* 11 *September* 1997)

ABSTRACT

This study examines mealtimes of preschoolers' families to determine whether rare words are used in informative ways so that a child could learn their meanings. Is there an association between informative use of rare words and the child's later vocabulary? Each use of rare words in 160 transcripts was coded for whether it was informative or uninformative. Each informative exchange was coded for type of strategy used to provide support: physical or social context, prior knowledge, and semantic support. There were 1,631 exchanges around rare words. About two-thirds of these exchanges were informative uses from which the child could learn the word's meaning. The most frequent strategy used was semantic support, accounting for two-thirds of strategies used. The frequency of use of rare words was positively correlated with age-five and age-seven PPVT scores.

## INTRODUCTION

One of the major arguments in the study of lexical development addresses what sort of cognitive endowments and experiences children have at different ages. Two general approaches to the argument are found in the research literature. First, the constraints argument draws on Quine's (1960) oft-cited *gavagai* example: word learners are faced with a huge problem of induction, sorting out the meaning of a novel word from a vast set of possibilities. When

[*] I would like to thank Patton Tabors for ongoing generative discussions about the direction and potential of this work, and for her assistance with reliability checks. The careful comments by two anonymous reviewers were very helpful in making this a stronger paper. I also thank Washington University for a Faculty Research Grant to carry out the analysis in this study. Special thanks to the families who allowed the Home-School Study of Language and Literacy Development to listen in on their mealtimes, to all the researchers on the project who have contributed to this work (especially Catherine Snow and David Dickinson), and to the Ford Foundation and Spencer Foundation who funded the project. This paper is dedicated to the memory of my friend, Donald R. Beasley. Address for correspondence: Diane E. Beals, Washington University, Department of Education, Campus Box 1183, St Louis, MO 63130, USA.




https://doi.org/10.1017/S0305000997003267

a rabbit hops by and a speaker of another language says 'gavagai,' how do we know what the speaker means? Is she naming the category ('rabbit'), or an individual ('Bugs')? Is she pointing to its colour ('grey'), its texture ('furry'), or a single feature ('long ears')? Is she referring to its mode of movement ('hopping'), its speed ('quickly') or its destination ('hole in the ground')? How can a word learner know what the speaker meant?

Constraints theorists emphasize the complexity of the information coming to word learners. They also point to the fact that very young children, despite this complexity, are able to learn words at the remarkable rate of eight to ten words per day (Carey, 1978; Anglin, 1993), and argue for the existence of default assumptions which organize incoming information and reduce ambiguity to a point where the child can make a reasonable inference about a word's meaning. For example, the whole-object assumption (Markman, 1994) asserts that very young children assume that words used in the presence of a novel object are labels for the whole object, not a part or a feature. The taxonomic assumption (Markman, 1994) states that words refer to entities of the same kind; an object label also refers to objects of the same kind, an action word refers to actions of the same kind. These are two of a number of such default assumptions that children are believed to bring to word learning situations, at least partially solving the problem of induction.

The second approach to the argument about lexical development de-emphasize the child's pre-existing (or at least early-developing) cognitive equipment in order to focus on the experiences the child has that allows him to learn new words. These theorists argue that the social situation in which a new word appears is so replete with structure and redundancy that we do not need to posit constraints in the mind, at least until we have exhausted the possibilities of what can be learned from the social and cultural setting. Tomasello (1992: 215), for example, argues that the social–communicative context often has numerous clues that aid the child's narrowing down of the many possibilities for a word's meaning. Taking up Quine's *gavagai* example, he writes:

> Suppose, for example, that just preceding the native's pointing to the passing rabbit and saying 'Gavagai', the foreigner requests (through an interpreter) to know the native's name for colours. In this case there is a background context that makes the native's verbal reference perfectly clear (gavagai means 'brown'). In the absence of such an explicit context, there still could be a nonlinguistic context that makes the native's intentions clear to some degree; for example, if the native and the foreigner are hunting together, this makes colour naming very unlikely and object naming (and some other things) much more likely.

Tomasello argues that children learn new words through a process he calls CULTURAL LEARNING. In this process, the learner attempts to organize the




https://doi.org/10.1017/S0305000997003267

world through another's intentions. This goes beyond mere mimicry of the behaviour of others; it is 'imitatively learning'... by 'reproducing the behaviour of another with an understanding of (or at least a hypothesis about) what the other is doing and why she is doing it' (p. 217). This approach emphasizes the social and cultural experiences that children have access to in order to learn the meanings of novel words.

The *gavagai* example carries an important assumption: a human being learns the meaning of a new word within a social context in which another person uses the word. Quine is not alone in this assumption: all theories of word learning carry the assumption that somewhere children hear someone else use the word and somehow make a connection between the word and at least some sense of the word. Even in constraints theories, which focus on cognitive endowment, the child must acquire the word in a social context because words are conventional symbols for the concepts or events in question. An important research issue, then, is to clarify whether word learning situations are relatively rich or impoverished in terms of the availability of information from which children can make inferences about the meaning of a word.

In the following exchange, Rosalyn's father uses a word, 'license' that is not likely to be in the vocabulary of a five-year-old:

(1): (*Target child : Rosalyn, age 5*)

| | |
|---|---|
| *Father: | pretty soon you'll be big enough to drive to the store and buy the groceries for us. |
| *Rosalyn: | I will? |
| *Mother: | (laughs) |
| *Father: | well about thirteen or fourteen years. |
| *Rosalyn: | I will? |
| *Father: | sure. |
| *Father: | in fourteen years. |
| *Rosalyn: | that's fun. |
| *Father: | in fourteen years you'll be seventeen. |
| *Father: | and you'll [/] you'll have your driver's *license* and go grocery shopping. |
| *Mother: | in fourteen years she'll be nineteen. |
| *Father: | oh right I'm sorry. |
| *Father: | gee! |
| *Father: | only twelve years and you'll be seventeen. |
| *Father: | suppose Cindy will go grocery shopping for us when she gets her *license*? |
| *Rosalyn: | hmm (laughs). |
| *Father: | maybe she'll offer to do it just so she can drive the car (laughing). |

*Mother: I don't know.
*Father: that would be the only reason she'd offer.
*Mother: mmhm.
*Rosalyn: that would be real good. (giggles).
*Rosalyn: I hope she doesn't crash.
*Father: well we hope she doesn't crash either.

The father does not stop to define the word, describe what a license might look like, or show Rosalyn his own driver's license. But there seems to be information in the conversation for Rosalyn to learn at least some sense of the word's meaning. She can infer that it has something to do with driving, and that you can only get it when you are older. In fact, we see that she picks up on this information when she jokes about her older sister crashing while driving. The conversational context affords Rosalyn the opportunity to gain some understanding of the term 'license'. If this is her first exposure to the word she seems to have acquired an initial mapping of the word to its referent. If she has heard the word used before, then she may have gained some additional understanding.

The work on FAST MAPPING (Carey, 1978, 1982; Carey & Bartlett, 1978; Dickinson, 1984; Dollaghan, 1985; Heibeck & Markman, 1987), in which children quickly acquire at least some sense of a new word through a single exposure to it, has shown that children learn words with only an incidental exposure to them. Rice (1990) has expanded the model of fast mapping to what she calls QUICK INCIDENTAL LEARNING (QUIL) of words. QUIL is built on six assumptions. The first assumption points to the importance of the social and physical context, asserting that word learning begins in the 'initial, partial comprehension of a word's meaning, drawn from the situational context' (Rice, 1990: 176). Second, a number of cognitive tasks are required of the child in QUIL, including segmenting the speech stream to identify the new word, mapping a possible referent to the new word, comparing and adjusting current lexical items with the new word-to-referent mapping, and then storing the word in semantic memory for later retrieval. This assumption focuses on the cognitive processes children bring to bear when learning new words. The third assumption of QUIL is that it is NOT necessary for a child to be tutored in the use and meaning of the new word, by drawing attention to the referent, by labelling, and by providing feedback to the child. Children learn something about new words without direct instruction. Fourth, QUIL occurs with all classes of words, not just the object labels and feature words used in fast mapping studies. The fifth assumption suggests that the rate and process of QUIL varies according to the class of words. For example, Braine (1987) has argued that nouns are easier to learn than verbs, and verbs are easier to learn than adjectives. Sixth, as age increases, QUIL is used more often and more efficiently. Older




https://doi.org/10.1017/S0305000997003267

children have a larger lexicon and conceptual inventory to build on, and greater facility with categorization than younger children, making them better QUILers.

Rice examined how QUIL works in experimental settings with young children. Her main conclusion from these studies is that, at about age three, children no longer require negotiated joint attention and isolated word labels in order to infer the meaning of a new word. This leaves open the possibility for children to acquire new words in a wide variety of everyday conversational settings, spontaneous interactions in which there is little or no planning for instructing children directly on word meanings. Quick Incidental Learning becomes a powerful source for vocabulary development after age three.

A crucial question arises from the work on QUIL: if we believe that children can learn words from everyday conversations, what sorts of contextual supports are actually available to children in these conversations and how frequently do these supports occur? Historically, it has been reading researchers that have identified specific ways in which context helps children learn new words. For example, Deighton (1959) includes definitions, examples, modifiers, and restatement among ways that text reveals meanings of words. But only a handful of researchers have focused their attention on spontaneous adult–child conversation, usually in book reading situations, as a support for learning new words (e.g. Ninio, 1983; Whitehurst, Falco, Lonigan, Fischel, DeBaryshe, Valdez-Menchaca & Caulfield, 1988). An important next step in this line of research is to analyse spontaneous conversation between adults and children (rather than written text) for the ways that words are used that might make it possible for a child to begin to develop at least a partial understanding of the words' meanings.

One spontaneous conversational context which might yield information about contextual support for word learning is family mealtimes. During a mealtime, adults and children are in proximity for a period of time. The delivery and consumption of food must be accomplished, but talk goes beyond food to other topics and forms, such as narratives about an event of the day or an explanation of why firemen wear oxygen tanks. In one study of mealtime conversations in 31 low-income families with preschool-age children, Beals & Smith (1992) found that, on average, 18 percent of the mealtime conversations with three-year-olds and 12 percent of conversations with four-year-olds consisted of narratives, and that 17 percent of talk in conversations with three-year-olds and 15 percent of talk with four-year-olds consisted of explanations. The use of these two types of extended discourse was strongly and positively correlated with the child's Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) score at age five. More extended discussion around a topic by families at the dinner table was associated with stronger vocabularies in their young children. Because it takes a broad range of words to introduce a broad range of topics for discourse, it seems

reasonable to expect that these extended discussions will provide support for learning new words.

This article outlines a study of the use of rare words – words that would not be expected to be found in the vocabulary of a young child – by families of preschoolers in mealtime discourse. The study examines the situations in which rare words are used by family members to determine whether or not the use of the word is in some way informative to the child, such that she can learn at least some sense of the word's meaning. Specifically, the study responds to the following questions: (1) what kinds of support does the conversational context provide to children so that they can learn the meaning of rare words? (2) how often do these kinds of support occur in mealtimes? (3) who is providing the support? (4) what classes of words are spoken of in informative ways? and (5) is there an association between informative use of these rare words in mealtime conversations and the child's later vocabulary?

## METHOD

The data for this study are drawn from the Home–School Study of Language and Literacy Development, a longitudinal study of about 80 children from low-income families in the Boston, Massachusetts (USA) area (Snow, 1991). Of these families, about one-third were African-American or Hispanic. Half of the target children were boys, half were girls. Beginning at age three, each child was visited at home once each year up to the age of ten. During these visits, the experimenter asked the mother to engage in a number of language activities with the child (toy play, book reading, and retelling an event). At the end of the visit, mothers were given a blank tape and asked to audiotape a typical mealtime conversation. When the target children were three, 64 tapes were returned. When the children were four, 45 tapes were returned, and 51 tapes were returned when the children were five. A total of 160 tapes were collected and transcribed according to the Codes for Human Analysis of Transcripts (CHAT) conventions of Child Language Data Exchange System (CHILDES) (MacWhinney & Snow, 1990).

The mealtimes averaged 417 utterances, ranging from 17 to 1067 utterances in length, and were, on average, 19·6 minutes in length, with a range of 2–47 minutes. There was a wide range of family constellations. Some families consisted only of the mother and target child, while other families had siblings or other children present. Fathers were present in 52 of the mealtimes. Some families included other adults: for example two families consisted of the mother, child, and grandparents.

### *Identifying rare words*

The 160 mealtime transcripts were analysed using the Child Language Analysis (CLAN) software. A complete list of all words used in the transcripts was generated. In order to identify rare words from the list, all

words from the Chall & Dale (1995) list of the 3000 most common words and their inflections (a total of 7881 words) were removed. The Chall & Dale list, based on Thorndike's early work on word frequency (Thorndike, 1921, 1932; Thorndike & Lorge, 1994), is a well-known and well-tested list of words and their frequency of occurrence. These are words that fourth graders recognize when reading and know their meanings.

After removing all common words, the remaining list was further edited, removing a set of words not considered rare including: proper nouns; exclamations, conversational markers, and expletives; forms of address; child reduced forms; slang, dialectical forms, and incorrect forms; and child culture terms. (See Beals & Tabors, 1995, for a full explication of the use of the Chall & Dale list and of the process of developing the various word lists.) The resulting list contained words which would be considered rare in the vocabulary of three-, four-, and five-year-olds.

For the purposes of this analysis, the decision was made to exclude rare adverbs (a total of 189 word tokens, and 18 different word types, all ending in -ly[1]), compound words (usually made up of two or more common words – if one (or both) of these words was rare it stayed on the rare word list), and food words (usually appeared as rare words, but did not seem to be unknown to the children). The remaining list consisted of 1126 different words. Each use of each of these rare words was then identified in the 160 mealtime transcripts.

*Coding for contextual support*

Beginning with six transcripts, each exchange in which a rare word was used was coded for whether or not the context was informative to a listener who may not have known the word. Coding was carried out by attempting to take the perspective of a young child (as much as a child language researcher is able to!), by asking the question, 'could a child of age 3, 4, or 5 gain some sense of the word's meaning from this use of the word if this was the child's first exposure?' Example 1 (above) demonstrates a use of a rare word considered to be informative (as are examples 5–10 below), while Examples 2, 3, and 4 present three uninformative uses of rare words. (These transcripts have been simplified from the CHAT (CHILDES) format for ease of reading. In all examples, the target child's name and age is given; the rare

[1] Of these 189 uses of rare adverbs, 135 were uses of 'actually', 'probably', and 'usually'; another 35 uses were other modifiers of intensity, probability, or frequency. These were uses that the author and other reliability judges found to be very difficult to rate as either informative or uninformative, as they only increased or decreased the intensity of an adjective or verb. The remaining 19 adverb uses (6 different words: 'fiercely', 'patiently', 'vividly', 'seriously', 'desperately', and 'recently') were infrequent enough that the author believed that excluding all adverbs from the study would not seriously compromise the results of the remaining data on nouns, verbs, adjectives, and closed class words.




https://doi.org/10.1017/S0305000997003267

word is italicized: xxx indicates unintelligible material; # indicates a pause by the speaker.)

(2) (*Uninformative use of a rare word – Target child : Mike, age 3*)
*Sally: I was reading a dirty book last night when you came in.
*Mother: (laughs).
*Mike: xxx.
*Sally: it has a story to it but whenever they get in bed with each other they have *details* # very *explicit details*. (laughs)
*Mother: Mike come on # eat please?

(3) (*Uninformative use of rare word – Target child : Cheryl, age 5*)
*Brother: and I know there's someone that won't pick on me.
*Friend: who?
*Brother: that [/] that lives upstairs.
*Aunt: in his class.
*Brother: but he got *suspended*.
*Cheryl: xxx I know who can pick on me # Ralphy.
*Aunt: Ralphy picks on you?
*Brother: yes.
*Sister: he called her freckle juice.
*Cheryl: xxx.
*Sister: and xxx started crying today.
*Aunt: that's not very nice.
*Sister: I told him to stop it.
*Sister: I told him to stop it about three times and he just kept on saying that.
*Aunt: she should probably go tell his Mother about it then.

(4) (*Uninformative use of rare word – Target child : Parker, age 5*)
*Mother: what are you eating?
*Parker: um # spaghetti.
*Mother: spaghetti.
*Parker: mom that's xxx not spaghetti.
*Mother: it is spaghetti.
*Parker: no it isn't.
*Mother: uhhuh.
*Parker: is it [//] it's not spaghetti! (whining).
*Mother: then what is it?
*Parker: it's # it's # it's # ravio… # ravioli.
*Mother: it's not ravioli it's spaghetti.
*Parker: no it's not spaghetti (whining).
*Mother: ravioli's got # meat or cheese inside.
*Mother: it's [//] that's just [/] just *regular* um spiral spaghetti.

In Example 2, two mothers are carrying on a conversation in the presence of

their sons, Mike and Doug. The rare words, 'explicit' and 'details' may not even be heard by Mike, the target child, as he was conversing with Doug. Also the use of the two rare words together makes it even harder to see how Mike might infer the meaning of either words since their meanings depend on each other as part of the context. One must know one or the other word in order to make sense of the other. In Examples 3 and 4, the words 'suspended' and 'regular' (respectively) are used only once and in ways in which it would be difficult to make any serious claim of informativeness of the conversational context, unless the target child has had other experiences with the words and there meanings.

In order to answer the question of what types of contextual support for learning new words is offered in spontaneous conversation, each instance of informative use of rare words in these six transcripts was surveyed. Working inductively from these data, and drawing from the background of research on reading and word learning from book reading situations, (e.g. Deighton, 1959 on verbal semantic information; Ninio, 1983 and Whitehurst *et al.*, 1988 on using the physical and social context; De Temple, 1994 on drawing on prior knowledge) four different ways that contextual support was provided in informative exchanges were identified. These four categories were: physical context (indicating a demonstration of or the presence of an object or action – see Example 5), social context (pointing to social norms and behaviour and labelling it – see Examples 6 and 7), prior knowledge (calling on past experiences or general knowledge – see Example 8), and semantic support (giving some direct verbal semantic information).

(5) (*Physical context – Target child : Emily, age 3*).
*Emily: me need butter on this!
*Father: yes you do need butter on that corn.
*Mother: yeah here's the butter you # *twirl* it over the top of the big *cube* of butter.
*Emily: oh.
*Mother: dad'll show you how.
*Emily: me?
*Father: um I don't want your fingers all over it though.
*Father: there we go.

(6) (*Social context – Target child : Catherine, age 4*).
*Brother: (humming and talking with food in his mouth)
*Mother: Robert.
*Sister: Ma # can you please?
*Brother: (humming and talking with food in his mouth)
*Mother: Robert don't do that that's *rude*.

(7) (*Social context – Target child : Tammy, age 4*).
*Doug: can I have an ice cream sandwich please Mom?




https://doi.org/10.1017/S0305000997003267

*Doug: Mama please can I have an ice cream…
*Susan: just a minute!
*Susan: someone scarfed the last ice cream sandwich right?
*Doug: oh.
*Susan: how about # cookies.
*Doug: Tammy can I please have one of your twisters?
*Tammy: that's the only one. Gary had two.
*Mother: what's the matter? is this the great ice cream *debate*?
*Susan: well…
*Tammy: um Uncle Gary had all…
*Susan: xxx Gary tends to eat everything he doesn't care.

(8) (*Prior knowledge – Target child : Tommy, age 3*).
*Mother: Tommy you don't remember what you said you saw at the park?
*Tommy: oh yeah.
*Mother: what?
*Tommy: um # a…
*Tommy: I don't know.
*Mother: you don't remember the word?
*Tommy: no.
*Mother: an *iguana*.
*Tommy: oh an *iguana* xxx.
*Mother: yeah!
*Mother: did its owner let [/] let you pat him?
*Tommy: no # no.
*Mother: was he walking around all by himself?
*Tommy: mmhm.

The category of semantic support was an especially broad one. Examples 9 and 10 demonstrate semantic support using somewhat different approaches.

(9) (*Semantic support – Target child : George, age 4*).
*Mother: you have to wait a little while so you don't get *cramps*.
*George: what's *cramps*?
*Mother: *cramps* are when your stomach # feels all tight # and it hurts 'cause you have food in it.
*Mother: and you're in the water.

(10) (*Semantic support – Target child : Suzanne, age 5*)
*Grandma: is this done? (in another room; referring to noodles)
*Mother: needs to be drained!
*Grandma: oh it needs to be drained in the [//] in a xxx regular drainer?
*Mother: *colander* or just put it [//] put the cover to the edge and drain the water out.

In Example 9, we see George's mother giving him a definition of cramps at his request, while Example 10 demonstrates how a mother and grandmother's conversation provides a synonym and describes the function of a colander.

After this preliminary work of identifying categories of contextual support, each use of rare words in the 160 transcripts was coded for whether it was informative or uninformative. Sixteen (10 percent) of the transcripts were coded by the author and another judge to establish reliability. The Cohen's kappa statistic for informative/uninformative coding was 0·756,[2] indicating substantial (Landis & Koch, 1977) or excellent (Fleiss, 1981; Bakeman & Gottman, 1986) agreement. Each informative exchange was further coded for the type of strategy that the speaker(s) used to provide contextual support. Interrater agreement yielded a kappa statistic of 0·659, indicating substantial (Landis & Koch, 1977) or good (Fleiss, 1981) agreement. Additionally, each instance of contextual support was coded for which family member was providing the support; the Cohen's kappa statistic was 0·825, almost perfect (Landis & Koch, 1977) or excellent (Fleiss, 1981) agreement. All informative exchanges were coded for grammatical category (noun, verb, adjective, or closed class words, including prepositions, pronouns, and conjunctions).

Finally, associations between the frequency of informative uses of rare words and later vocabulary test scores (Peabody Picture Vocabulary Test – PPVT-R, Dunn & Dunn, 1981) were examined though correlational and regression analyses.

Because the target child was treated as the potential learner of the rare word meanings, the child's use of rare words was excluded from the analysis outlined above. These children requested word meanings only 19 times in the 160 transcripts.

## RESULTS

In the 160 transcripts, there were 1,631 exchanges in which rare words were used. Within these exchanges, a total of 2,052 rare word tokens were used by all family members excluding the target child; of these 2,052 uses, there were 421 multiple uses of rare words in exchanges. Target children used rare words 523 times.

About two-thirds of these exchanges were coded as informative uses from which the child could learn some sense of the meaning of the word; of the 1,631 exchanges, 1,053 (or 64·6 percent) were coded as informative uses of the rare word, 492 (30·1 percent) were uninformative, and 86 (5·3 percent) were

[2] Landis and Koch (1977) offer these guidelines for Cohen's kappa statistics: 0·00–0·20 Slight; 0·21–0·40 Fair; 0·41–0·60 Moderate; 0·61–0·80 Substantial; 0·81–1·00 Almost Perfect. Fleiss (1981) recommends the following interpretations of Cohen's kappa statistics: < 0·40 Poor; 0·41–0·60 Fair; 0·61–0·75 Good; 0·76–1·00 Excellent.




https://doi.org/10.1017/S0305000997003267

considered uncodable due to unintelligible material in the transcript. Overall, it appears that mealtime conversations frequently provided information about the meanings of this set of words.

The frequencies of the types of contextual support provided by the informative exchanges are found in Table 1. (In thirteen exchanges, speakers

TABLE 1. *Overall frequencies of contextual support strategies* (*and mean frequency by family*)

| Age of child | *n* | S | PC | SC | PK | Total | UnInf |
|---|---|---|---|---|---|---|---|
| 3 | 64 | 238 | 78 | 40 | 29 | 385 | 167 |
| | | (3·7) | (1·2) | (0·6) | (0·5) | (6·0) | (2·6) |
| 4 | 45 | 188 | 54 | 46 | 23 | 311 | 159 |
| | | (4·2) | (1·2) | (1·0) | (0·5) | (6·9) | (3·5) |
| 5 | 51 | 225 | 69 | 54 | 22 | 370 | 166 |
| | | (4·4) | (1·4) | (1·1) | (0·4) | (7·3) | (3·3) |
| Total | 160 | 651 | 201 | 140 | 74 | 1066 | 492 |

*n*, Number of transcripts; S, semantic support; PC, physical context; SC, social context; PK, prior knowledge; UnInf, uninformative.

used two different types of contextual support, so there is a total of 1,066 strategies employed in the 1,053 informative exchanges.) The most frequent strategy used was that of semantic support accounting for 651 (61·1 percent) of 1,066 strategies used. Use of the physical context strategy accounted for 201 (18·8 percent) exchanges, use of social context strategy accounted for 140 (13·1 percent) exchanges, and the prior knowledge strategy was surprisingly infrequent, used only 74 times (6·9 percent). The low proportion of physical context strategy may have been modified by the exclusion of food words, as food was always present at mealtimes and was often a topic of conversation.

Table 1 also presents these results by age of the target child. Use of physical context and prior knowledge remained similar over time. Although the trend was not statistically significant, semantic support and social context frequencies increased slightly over time. This trend follows the (non-significant) increase in number of informative exchanges over time.

Another question of interest was who among speakers at mealtimes was executing these strategies. Table 2 indicates which speaker provided the contextual support in the 1,053 uses of the different strategies. Mothers accounted for over one half of the strategies (557 of 1,053 or 52·9 percent). While fathers were present in 52 of the 160 mealtimes (32·5 percent), they executed the strategies in only 108 exchanges (10·1 percent). Multiple speakers (exchanges in which two or more speakers, frequently including the mother, produced utterances that were necessary for providing the support)




https://doi.org/10.1017/S0305000997003267

TABLE 2. *Frequency of speaker providing contextual support strategies in 160 transcripts*

| Speaker | S | PC | SC | PK | Total |
|---|---|---|---|---|---|
| Mother | 291 | 135 | 86 | 45 | 557 |
| Father | 65 | 14 | 18 | 11 | 108 |
| Multiple | 187 | 16 | 15 | 12 | 230 |
| Others | 108 | 36 | 21 | 6 | 171 |
| Total | 651 | 201 | 140 | 74 | 1066 |

S, semantic support; PC, physical context; SC, social context; PK, prior knowledge.

TABLE 3. *Frequency of grammatical category by contextual support strategies in 160 transcripts* (*percentage of exchanges in each grammatical category*)

| Category | S | PC | SC | PK | Total | UnInf |
|---|---|---|---|---|---|---|
| Noun | 359 | 137 | 26 | 56 | 578 | 241 |
| | (55) | (68) | (19) | (76) | (54) | (49) |
| Adjective | 163 | 31 | 62 | 13 | 269 | 116 |
| | (25) | (15) | (44) | (18) | (25) | (24) |
| Verb | 116 | 27 | 49 | 4 | 196 | 103 |
| | (18) | (13) | (35) | (5) | (18) | (21) |
| Closed class | 13 | 6 | 3 | 1 | 23 | 32 |
| | (2) | (3) | (2) | (1) | (2) | (6) |
| Total | 651 | 201 | 140 | 74 | 1066 | 492 |
| | (100) | (100) | (100) | (100) | (100) | (100) |

S, semantic support; PC, physical context; SC, social context; PK, prior knowledge; UnInf, uninformative.

provided support in 230 exchanges (21·6 percent). When broken out by the different strategy types, mothers accounted for the greatest number of exchanges in each strategy.

Frequencies of informative rare word use by grammatical category are presented in Table 3. Nouns account for the majority of words used with semantic support, prior knowledge, and physical context strategies. However, the social context strategy strayed from this pattern of distribution. Speakers most often used the social context strategy to provide support for learning adjectives (see Example 2 above). Verbs used informatively were relatively infrequent, appearing only 196 times (18·4 percent). But with the social context strategy, verbs represent a much larger proportion (35·0 percent).

Using a loglinear analysis, an interaction between grammatical class and type of contextual support was observed (likelihood ratio $\chi^2$ statistic = 0·00, $p$ = 1·00, d.f. = 0) so that the null hypothesis that the cell counts depend on the main effects of grammatical class and contextual support and on the

interaction between these two variables cannot be rejected. This interaction can be seen by the varying profiles of use of contextual support types among the four grammatical classes (see Fig. 1). In particular, verb and adjective

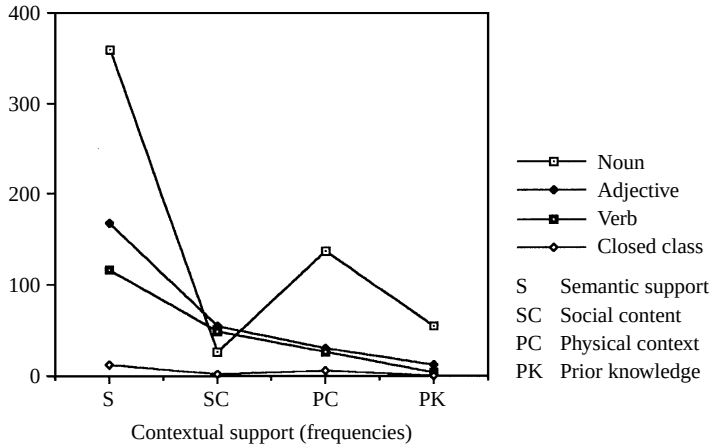


Fig. 1. Interactions between type of contextual support and grammatical class.

profiles are fairly similar across all types of contextual support; the noun and closed class profiles differ markedly from each other and from verb and adjective profiles. While closed class words were relatively infrequent in the data (and hence had a relatively flat line representing them), the noun profile is radically different from the other categories in its higher frequency and in its variation across the different types of contextual support.

Comparing the use of nouns, adjectives, and verbs within semantic support and social context only, indicates that if the rare word is a noun, there is a 12·4 times greater likelihood (estimated odds) that the contextual support type will be semantic support than social context. The estimated odds of verbs and adjectives are also greater than 1 for the same comparison, but only 2·4 and 3·0 respectively. If the strategy used for presenting a rare word is social context as opposed to physical context, the estimated odds that the rare word is a noun is 4·7, while for verbs and adjectives, the direction of the relationship is reversed, both having estimated odds of 0·6.

Closed class words, such as prepositions, pronouns, and conjunctions, were used informatively only 23 times in the 160 transcripts. Of these informative uses, the most frequent strategy used was semantic support, with 13 uses (56 percent). Another six uses (26 percent) appeared with physical context strategy. The conjunction 'unless' and the preposition 'underneath' were each used seven times informatively. Semantic support was the only

strategy used for 'unless'; it is difficult to think of a case where physical or social context could be used. But, 'underneath' was present within prior knowledge, physical context, and semantic support.

The data presented so far have demonstrated that the children in the study were provided with a broad range of words and supports for learning those words. An important question remains: is exposure to rare words associated with a child's vocabulary? Is there an association between exposure to rare words used in an informative way during the preschool years and the child's vocabulary size later on? In order to investigate this issue, correlations were computed between the frequency of informative uses of rare words at all three mealtimes, and the child's Peabody Picture Vocabulary Test scores at ages five and seven. Table 4 presents the results of this analysis.

TABLE 4. *Correlations* (*Pearson* r) *between frequencies of rare word use and PPVT scores*

| | Age 5 PPVT | Age 7 PPVT |
|---|---|---|
| Age 3 at mealtime | $n = 58$ | $n = 50$ |
| Total informative uses | 0·417*** | 0·368* |
| Uses of semantic support | 0·348* | |
| Uses of social context | | |
| Uses of physical context | | |
| Uses of prior knowledge | | 0·417** |
| Age 4 mealtime | $n = 44$ | $n = 39$ |
| Total informative uses | 0·433** | 0·495*** |
| Uses of semantic support | 0·481** | 0·481** |
| Uses of social context | | |
| Uses of physical context | | |
| Uses of prior knowledge | 0·497** | 0·417* |
| Age 5 mealtime | $n = 51$ | $n = 43$ |
| Total informative uses | 0·545*** | 0·518*** |
| Uses of semantic support | 0·575*** | 0·500*** |
| Uses of social context | 0·425** | 0·380* |
| Uses of physical context | 0·422** | 0·508*** |
| Uses of prior knowledge | | |

* $p < 0·01$; ** $p < 0·005$; *** $p < 0·001$.

At all three mealtimes, the frequency of informative uses of rare words was positively correlated with age-five and age-seven PPVT scores. The more often rare words are used in informative ways during the child's preschool years, the greater his vocabulary at age five and age seven. Use of the semantic support strategy was another correlate with vocabulary later on: at all mealtimes, frequency of this strategy was positively correlated with PPVT at age five, and for the age-four and age-five mealtimes, frequency of




https://doi.org/10.1017/S0305000997003267

semantic support was positively correlated with the age-seven PPVT. There were no correlations between vocabulary scores and uninformative uses of rare words. In mealtime discourse during the preschool years, children's exposure to informative uses of rare words, and especially semantic support strategies, appears to be a strong correlate of their later vocabulary. (There was a similar pattern of correlations when the proportion of rare word uses over all words in the transcript was considered instead of raw frequencies. When the Expressive One Word Picture Vocabulary Test (Gardner, 1981), also given at age seven, was used instead of the PPVT, there was the same pattern of correlations as found with the PPVT.) (These redundant results are not presented here in order to simplify the presentation.)

The remaining strategies varied in the occurrence of correlations. Prior knowledge strategy at age-three and age-four correlated with age-seven PPVT scores, and age-four prior knowledge strategy use was associated with age-five PPVT scores. The frequencies of use of physical context and social context strategies at the age-five mealtimes were associated with age-five and age-seven PPVT scores.

In general, the same contextual support variables are correlated with both the age-five and age-seven PPVT scores, reflecting the fact that the two PPVT scores are highly correlated ($r = 0{\cdot}740$, $p < 0{\cdot}001$). It is possible that if a regression model predicting the vocabulary scores at later ages (in this case, age seven) controlled for vocabulary score at an earlier time (e.g. age five) that exposure to rare word use at mealtimes would no longer be associated with later vocabulary scores. In order to test the possibility that a child's vocabulary scores are measuring and explaining the same variance (in a linear model) in later PPVT scores as the child's exposure to the rare words, a multiple regression analysis was performed. This model predicted age-seven PPVT using rare word use variables, controlling for age-five PPVT. (Unfortunately, the target children's vocabulary score at ages three or four are not available to test the same hypotheses for earlier ages.) This analysis would indicate if there were any additional variation in age-seven vocabulary that rare word exposure explains. Table 5 presents a summary of the regression models.

All the models indicate that informative uses of rare words contribute some additional, but relatively small, explanation of variance in the age-seven PPVT score. Note that, although the correlations between predictors are relatively strong (as per Table 4), the tolerance statistic estimates are relatively high, except at age five. This suggests that the exposure a child has to rare words in informative conversations at ages three and four is to some extent a predictor of his vocabulary.

The predictors in Models V, VI, and VII in Table 5 violate the assumption of independence of predictors in multiple regression, indicated by tolerance statistics below 1·000, and by the slope ($\beta$) estimates that did not reach

TABLE 5. *Regression models predicting age-7 PPVT by age-5 PPVT and informative rare word use*

| Model | Variable | $\beta$ | Tolerance | $R^2$ | $F$ | $\Delta R^2$ | $dfE$ |
|---|---|---|---|---|---|---|---|
| I | PPVT (5) | 0·728*** | | 0·548 | 75·04*** | | 62 |
| II | INF (3) | 0·889* | | 0·136 | 7·54* | | 48 |
| III | INF (4) | 1·100*** | | 0·245 | 12·02*** | | 37 |
| IV | INF (5) | 0·968*** | | 0·268 | 15·02*** | | 41 |
| V | PPVT (5) | 0·695*** | 0·824 | 0·585 | 32·39*** | 0·037*** | 46 |
| | INF (3) | 0·184 | | | | (from Model I) | |
| VI | PPVT (5) | 0·523*** | 0·814 | 0·864 | 23·31*** | 0·018*** | 36 |
| | INF (4) | 0·501 | | | | (from Model I) | |
| VII | PPVT (5) | 0·635*** | 0·687 | 0·592 | 28·96*** | 0·044*** | 40 |
| | INF (5) | 0·251 | | | | (from Model I) | |

* $p < 0·01$; ** $p < 0·005$; *** $p < 0·001$.

TABLE 6. *Principal components analysis of age-5 PPVT scores and mealtime informative use of rare words*

| Child's age | Variables included | 1st Component eigenvectors | 1st Component eigenvalues | Percent variance explained by comp. |
|---|---|---|---|---|
| 3 | PPVT (5) | 0·842 | 1·417 | 70·9 |
| | Informative | 0·842 | | |
| 4 | PPVT (5) | 0·847 | 1·433 | 71·7 |
| | Informative | 0·847 | | |
| 5 | PPVT (5) | 0·879 | 1·545 | 77·2 |
| | Informative | 0·879 | | |

TABLE 7. *Regression models predicting age-7 PPVT scores by composites of age-5 PPVT and age-3, age-4, and age-5 (each respectively) informative uses of rare words*

| Model | Variable | $\beta$ | $R^2$ | $F$ | $dfE$ |
|---|---|---|---|---|---|
| I | Component (3) (age-3 informative uses and age-5 PPVT) | 10·76*** | 0·464 | 40·73*** | 47 |
| II | Component (4) (age-4 informative uses and age-5 PPVT) | 9·84*** | 0·519 | 40·00*** | 37 |
| III | Component (5) (age-5 informative uses and age-5 PPVT) | 11·04*** | 0·523 | 45·01*** | 41 |

* $p < 0·01$; ** $p < 0·005$; *** $p < 0·001$.

statistical significance ($p < 0·05$). In order to develop models using the age-five PPVT and the number of informative uses of rare words at ages three, four, and five, without this problem of multicolinearity, three principal components analyses were run on each of these pairs of predictors. The first




https://doi.org/10.1017/S0305000997003267

principal component of each of these three analyses explained at least 70 percent of the variance in the two variables. In Table 6, the eigenvectors indicate the loading, or weights, of each original variable into each component; the number of informative uses of rare words at each age level and the age-five PPVT each contribute equivalent amounts of variance to the first component of each principal components analysis.

Table 7 presents the results of a new regression analysis using these new variables, composites of the age-five PPVT and the number of informative uses at age three, four, or five. Each regression model using this first component to predict age-seven PPVT, accounts for substantial portions of the explanation of variation in these models. Exposure to informative uses of rare words is still a significant correlate of later vocabulary score.

## DISCUSSION

These results suggest that the conversational context around the use of a rare word may be informative enough for children to learn some sense of the word's meaning. While this is not an unexpected finding, other studies have used experimental situations, not everyday discourse, in which only a few new words are introduced in some controlled way. This study examined the wide variety of everyday uses of rare words embedded in mealtime discourse, taking another step toward establishing an empirical link between spontaneous, everyday conversation and children's learning of new words and their meanings.

The results of the study indicated that preschool-age children are provided with a great deal of information about rare words that are spoken in their hearing; about two-thirds of the exchanges around the use of rare words were coded as informative about these words' meanings. In these exchanges, children heard conversation that drew on their prior knowledge, pointed to the physical and social context, and provided verbal semantic information. This provides support for QUIL's (Rice, 1990) first assumption, that social and physical context of use of a new word allows for a child to begin to learn the word's meaning. Here we have seen that rare words are frequently used in informative ways in mealtime conversations, affording children the opportunity to hear their use in a meaningful context.

Mothers provided most of the informative uses of rare words. Fathers, when present at the mealtimes, tended to provide less support for word learning. The preschool-age target children sometimes used rare words, suggesting that they already knew some of the words, or that they were trying out their understanding from hearing the word in conversation. But, these children seldom asked directly for the meaning of rare words used by other speakers.

Nouns were the rare words most frequently appearing in conversation with contextual support. Adjectives were also about half as frequent as nouns,

while verbs appeared about one-third as frequently as nouns. Rare closed class words were seldom used either informatively or uninformatively. Nouns, overall, seem to lend themselves better to discussions that somehow suggest their meaning. However, in the social context category of contextual support, adjectives and verbs were more frequent than nouns. Pointing to the immediate social context seemed to be a strategy that is better suited to indicating meanings of adjectives and verbs rather than nouns, while semantic support, physical context and prior knowledge are much more frequent strategies for presenting nouns. And the different grammatical classes of words displayed different patterns of use among the various types of contextual support.

The QUIL's fourth assumption, that it works with all grammatical classes of words, gains some support in this study: nouns, verbs, adjectives, and function words were used informatively. Related to this is Rice's fifth assumption that the rate and process of QUIL varies by class of words. The varying frequency of use of different classes of words with different strategies indicates that different classes of words are more frequently presented in certain ways. It is likely then that the rate and process of QUIL will vary due to these differences in presentation within the conversational context.

Although this study has not attempted to show whether or not the target children actually learned some sense of the specific rare words they were exposed to, it seems reasonable to suggest that, in light of the research on the rapid rate of word learning, at least some of this learning can take place within everyday conversations of the sort presented here. Discourse that engages children in extended discussion around a topic offers many opportunities for the child to hear unusual words being used by a more knowledgeable speaker, and perhaps to make the appropriate semantic connections with what they already know.

There are several possible interpretations of the positive linear relationships between informative uses of rare words and later vocabulary size that were found in this study. One possibility is that a child's vocabulary score is a direct effect of exposure to informative uses of rare words in discourse. Another is a more genetic explanation: parents who have larger vocabularies have children who have larger vocabularies; the use of more rare words is an artefact of these larger vocabularies. A third explanation, one that bridges the environment versus genetics debate, suggests that families that talk a lot about a wide range of topics (and, hence, rare words) may have some natural language ability, but extensive and intensive conversations trigger and build on this inborn talent. This issue of vocabulary size (and IQ) has been argued for years with no consensus on possible answers. However, the results of the analysis here suggest that even when controlling for earlier vocabulary score, exposure to informative uses of rare words contributes some unique explanation of the variance in later vocabulary score.

This study is an early step in outlining connections between lexical development and the development of discourse – in this case, conversational discourse. While these connections seem obvious, little theoretical work has been done to explain them.

One notable attempt at such an explanation is that of Anderson & Freebody (1981). In their review of studies of children's vocabulary knowledge, they focused on the consistent finding of positive correlations between vocabulary and comprehension of written discourse. They suggest three explanations for this finding. The first view they call the INSTRUMENTALIST position, which emphasizes that knowing a lot of words and their meanings, especially those found in a particular text, allows one to comprehend that text. This view, according to Anderson & Freebody, ignores the source of word learning, and states only that possession of a large vocabulary has a causal link to reading comprehension. The second position, the APTITUDE hypothesis, is that a person who has high vocabulary and comprehension scores has greater mental ability overall. Vocabulary knowledge is reflective of verbal ability which allows one to comprehend text. There is no suggestion as to how they work together, although this view is often found in 'nature' arguments. The KNOWLEDGE hypothesis is the third position, pointing to the 'nurture' side; it suggests that vocabulary knowledge is a reflection of knowledge and experience of the culture, which is crucial for text comprehension. The knowledge view points to conceptual frameworks, or 'schemata', in which individual word meanings are interrelated to other words and their meanings and other kinds of knowledge.

This third position holds the most promise for understanding what it is children do when they learn a new word in the context of conversation. While it does not address the issue of pre-existing cognitive constraints, it points to the ways that human beings organize information coming from the physical and social world around them. An important next step in this research would be to examine how children actually make sense of the different types of information available in conversation to gain new understanding of word meanings. Bartlett's notion of schema (Bartlett, 1932; Edwards & Middleton, 1986; Beals, in press) is pertinent here; he emphasized how people use the meanings of words to make connections between old, already known material and new material. By teasing apart the kinds of meanings that children are presented with in the forms of everyday conversation, we may be able to see how discourse supports the construction of schema.

These schemata, or networks of meaning, that we construct and reconstruct throughout our lives in interaction with others allow us to see the link between individual words and longer stretches of discourse. Words are not stand-alone mental objects that have some abstract semantic content. It is in conversation with others that children are exposed to words embedded in the messiness of everyday life.

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